

Claims

1. A deformable mirror holder comprising a body with a receiving portion for receiving a deformable mirror, and wherein the receiving portion is defined by a passive flexible support structure such that, in use, the support structure provides a supporting surface to the mirror.  
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2. A deformable mirror holder as claimed in claim 1, wherein the support structure comprises a plurality of discrete flexible support elements spatially arranged to support the mirror substrate from below, with each of the support elements having an end shaped to provide support to the mirror substrate and a flexible portion that connects the element's end to the holder's body.  
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3. A deformable mirror holder as claimed in claim 2, wherein at least one of the support elements is generally L-shaped such that one leg of the L-shape provides the flexible portion and the other leg of the L-shape provides the supporting surface of the element's end.  
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4. A deformable mirror holder as claimed in claim 2 or claim 3, wherein at least some of the support elements are disposed in equi-spaced relationship in a circular arrangement, each positioned so as to be in contact with one or more mirror electrodes when in use.
- 20 5. A deformable mirror holder as claimed in any one of claims 2 to 4, wherein, in use, each of the support elements is positioned so as to be in supportive contact with a different mirror electrode.
6. A deformable mirror holder as claimed in any of claims 2 to 5, wherein the support elements are formed of compliant epoxy/rubber material.
- 25 7. A deformable mirror holder as claimed in any of claims 2 to 5, wherein the end-shaped supporting portion of each element is formed of compliant epoxy/rubber material and the remainder portion of each element is formed of metal material.

- 24 -

8. A deformable mirror holder as claimed in any of claims 2 to 5, wherein the support elements are formed of a conducting compliant foam such that they permit electrical connection to a number of mirror electrodes.
9. A deformable mirror holder as claimed in any of claims 2 to 8, wherein  
5 the support elements are integrally formed as part of the holder body.
10. A deformable mirror holder as claimed in any of claims 6 to 9, wherein the compliance of compliant material selected to form at least a portion of each of the support elements is adjusted according to the position of the support element in the support structure.
- 10 11. A deformable mirror holder as claimed in claim 10, wherein the compliance of the selected compliant material varies according to the distance of the respective support element from the edge of a supported mirror substrate.
12. A deformable mirror holder as claimed in claim 6, wherein the  
15 compliance of each of the support elements is adjusted according to the position of the support element in the support structure.
13. A deformable mirror holder as claimed in claim 12, wherein the compliance of each of the support elements is adjusted by varying the length of the support element.
- 20 14. A deformable mirror holder as claimed in claim 12 or claim 13, wherein the compliance of each of the support elements is adjusted by varying the cross-sectional area of the support element.
15. A deformable mirror holder as claimed in any one of claims 12 to 14,  
25 wherein the compliance of each of the support elements is adjusted by varying the compliance of the compliant material used to form the support element.
16. A deformable mirror holder as claimed in claim 1, wherein the support  
30 structure comprises a generally solid unitary structure with compliant characteristics, which unitary structure is arranged to extend across the entire mirror substrate surface for support thereof from below.

- 25 -

17. A deformable mirror holder as claimed in claim 16, wherein the unitary structure is formed of epoxy/rubber material.
18. A deformable mirror holder as claimed in claim 16 or claim 17, wherein the unitary structure includes a number of hole sections for permitting access to a number of mirror electrodes when in use.
19. A deformable mirror holder as claimed in claim 16 or claim 17, wherein the unitary structure includes a number of metallic interconnections permitting connection to a number of mirror electrodes when in use, which metallic interconnections are arranged to respond to the deformation of the unitary structure in use.
20. A deformable mirror holder as claimed in any one of claims 16 to 19, wherein the compliance of the unitary structure varies according to the distance from the edge of the unitary structure.
21. A deformable mirror holder as claimed in claim 20, wherein the unitary structure comprises a plurality of discrete annuli each composed of a compliant material having a different compliance.
22. A deformable mirror holder as claimed in claim 20 or claim 21, wherein the thickness of the unitary structure varies according to distance from the edge of the unitary structure.
23. A deformable mirror holder as claimed in claim 22 when dependent upon claim 19, wherein the unitary structure is composed of a compliant material having substantially uniform compliance.
24. A deformable mirror and a deformable mirror holder as claimed in any preceding claim.
25. A deformable mirror comprising a reflective surface provided on a substrate and a layer of deformable material attached to the substrate that is operable to deform the mirror, in combination with a deformable mirror holder as claimed in any of claims 1 to 23.
26. A deformable mirror in combination with a deformable mirror holder as claimed in claim 25 including a cooling system.

- 26 -

27. A deformable mirror in combination with a deformable mirror holder as claimed in claim 26 wherein said cooling system includes a number of interconnecting conduits which are joined to form a continuous through-passage, enabling coolant to be admitted and circulated therethrough.
- 5 28. A deformable mirror in combination with a deformable mirror holder as claimed in any of claims 24 to 27 including a tip-tilt stage.
29. A deformable mirror holder substantially as hereinbefore described with reference to any one of Figures 4 to 20 of the accompanying drawings.
30. A deformable mirror and a deformable mirror holder substantially as  
10 hereinbefore described with reference to any one of Figures 4 to 20 of the accompanying drawings.